WE CLAIM AS OUR INVENTION:

1. A method for computed tomography comprising the steps of:

a) scanning a subject with a conical radiation beam emanating from a focus of a radiation source and detecting radiation attenuated by said subject with a matrix detector array while moving the focus relative to the subject on a spiral path around a system axis, said detector array supplying output data corresponding to the detected radiation; and

b) reconstructing images having an inclined image plane from output data supplied during the movement of the focus on a spiral segment, the image planes of said images being inclined by an inclination angle γ around a first axis intersecting the system axis at a right angle and also being inclined by a tilt angle δ with respect to the system axis around a second axis that intersects the first axis and the system axis at a right angle.

2. A method as claimed in claim 1, wherein said focus moves around a z-axis comprising reconstructing said images with inclined image plane for a plurality n_{ima} of successive spiral segments, the inclined image planes exhibiting a same z-position z_{ima} on the z-axis, and immediately succeeding spiral segments being offset by at most 180° relative to one another and yielding an overall spiral segment having a length $[-\alpha_{max}, +\alpha_{max}]$, wherein $\alpha_{max} = M\pi/p$ and M is a plurality of detector rows in said detector and p is a pitch of said spiral path.

3. A method as claimed in claim 1, wherein said focus moves around a z-axis on said signal path and wherein each spiral segment has a length of 180° plus a cone angle of said radiation beam, and comprising reconstructing said images with inclined image plane for a plurality n_{ima} of successive spiral segments, the inclined image planes exhibiting different positions z_{ima} on the z-axis.

4. A method as claimed in claim 3, wherein the plurality of inclined image planes intersect in a straight line proceeding tangentially to the spiral path.

5. A method as claimed in claim 3, wherein said array is composed of M rows of adjacent rows extending transversely to the system axis and each having a width S and wherein for extreme values $+\delta_{max}$ and $-\delta_{max}$ of the tilt angle δ of the inclined image planes belonging to a spiral segment:

$$\pm\delta_{max} = \arctan\left(\frac{-\frac{SM}{2} + Sp\frac{\alpha_l}{2\pi} \pm RFOV \cos\alpha_l \tan\gamma_0}{-\frac{R_f}{\cos\gamma_0} - (\pm RFOV)\frac{\sin\alpha_l}{\cos\gamma_0}} \right)$$

wherein ±RFOV is a region of rows of said detector array, relative to a center of said detector array along the system axis, corresponding to a region of said subject covered by said radiation, γ_0 is a value of the inclination angle γ according to

$$\gamma_0 = \tan\left(\frac{-Sp\hat{\alpha}}{2\pi R_f \sin\hat{\alpha}} \right)$$

for the tile angle $\delta = 0$, wherein R_F is a position of the focus in the image plane and α is an angle at which the spiral path penetrates the image plane.

6. A method as claimed in claim 5, wherein the focus rotates around a rotational axis that coincides with the system axis.

7. A method as claimed in claim 5, comprising rotating the focus around a symmetry axis that does not coincide with the system axis and which intersects the system axis at a gantry angle ρ, and wherein :

$$\gamma' = \arctan \frac{Sp \cdot \cos\rho}{\sqrt{4\pi^2 \cdot R_f + S^2 p^2 + 4\pi \cdot R_f \cos\alpha \sin\rho \cdot Sp}}$$

8. A method as claimed in claim 5 comprising setting an optimum value γ_{min} of the inclination angle γ for a magnitude of the maximum value of the tilt angle $|\delta_{max}|$ so that an error criterion is satisfied.

9. A method as claimed in claim 3, wherein the detector array comprises M adjacent rows extending transversely to the system axis, each row having a width S, and wherein said spiral path has a pitch p, and comprising selecting a plurality n_{ima} of the inclined image planes for which images having inclined image plane are generated for each spiral segment according to:

$$n_{ima} = \text{floor}\left[\frac{SM}{P}\right]$$

10. A method as claimed in claim 9, comprising selecting respective tilt angles $\delta(i)$ of the inclined image planes n_{ima} according to

$$\delta(i) = \delta_{max} \frac{2i-(n_{ima}-1)}{n_{ima}-1}$$

11. A method as claimed in claim 1, comprising combining at least some of the plurality of images having inclined image plane to form a transverse tomogram having a transverse slice intersecting the system axis at a right angle.

12. A method as claimed in claim 11, comprising combining the plurality of images with inclined image plane to form said transverse tomogram by interpolation.

13. A method as claimed in claim 11, comprising combining the plurality of images with inclined image plane to form said transverse tomogram by forming an average.

14. A method as claimed in claim 13, comprising combining the plurality of images with inclined image plane to form said transverse tomogram by weighted averaging.

15. A method as claimed in claim 11, comprising selecting images among the plurality of images with inclined image plane for combining for generating said transverse tomogram according to a desired slice thickness of the transverse slice.

16. A method as claimed in claim 15, comprising selecting said images among the images with inclined image plane having a smallest possible slice thickness.

17. A method as claimed in claim 15, comprising selecting said images among the plurality of images having inclined image plane for combining for generating said transverse tomogram according to

$N_M = 2 \cdot \max(z^*, \sup_\Phi \Delta z_R)/S \cdot N_S$.

18. A computed tomography apparatus for computed tomography comprising the steps of:

a scanner having a radiation source and a matrix detector scanning a subject with a conical radiation beam emanating from a focus of said radiation source and detecting radiation attenuated by said subject with said detector array while moving the focus relative to the subject on a spiral path around a system axis, said detector array supplying output data corresponding to the detected radiation; and

a computer supplied with said output data for reconstructing images having an inclined image plane from said output data supplied during the movement of the focus on a spiral segment, the image planes of said images being inclined by an inclination angle γ around a first axis intersecting the system axis at a right angle and also being inclined by a tilt angle δ with respect to the system axis around a second axis that intersects the first axis and the system axis at a right angle.

19. A computed tomography apparatus as claimed in claim 18, wherein, in said scanner, said focus moves around a z-axis comprising reconstructing said images with inclined image plane for a plurality n_{ima} of successive spiral segments, the inclined image planes exhibiting a same z-position z_{ima} on the z-axis, and immediately succeeding spiral segments being offset by at most 180° relative to one another and yielding an overall spiral segment having a length $[-\alpha_{max}, +\alpha_{max}]$, wherein $\alpha_{max} = M\pi/p$ and M is a plurality of detector rows in said detector and p is a pitch of said spiral path.

20. A computed tomography apparatus as claimed in claim 18, wherein, in said scanner, said focus moves around a z-axis on said signal path and wherein each spiral segment has a length of 180° plus a cone angle of said radiation beam, and wherein said computer reconstructs said images with inclined image plane for a plurality n_{ima} of successive spiral segments, the inclined image planes exhibiting different positions z_{ima} on the z-axis.

21. A computed tomography apparatus as claimed in claim 20, wherein said scanner obtains the plurality of images with inclined image planes so that the inclined image planes intersect in a straight line proceeding tangentially to the spiral path.

22. A computed tomography apparatus as claimed in claim 20, wherein said array is composed of M rows of adjacent rows extending transversely to the system axis and each having a width S and wherein for extreme values $+\delta_{max}$ and $-\delta_{max}$ of the tilt angle δ of the inclined image planes belonging to a spiral segment:

$$\pm\delta_{max} = \arctan\left(\frac{-\frac{SM}{2} + Sp\frac{\alpha_l}{2\pi} \pm RFOV\cos\alpha_l \tan\gamma_0}{-\frac{R_f}{\cos\gamma_0} - (\pm RFOV)\frac{\sin\alpha_l}{\cos\gamma_0}} \right)$$

wherein ±RFOV is a region of rows of said detector array, relative to a center of said detector array along the system axis, corresponding to a region of said subject covered by said radiation, γ_0 is a value of the inclination angle γ according to

$$\gamma_0 = \tan\left(\frac{-Sp\hat{\alpha}}{2\pi R_f \sin\hat{\alpha}} \right)$$

for the tile angle $\delta = 0$, wherein R_F is a position of the focus in the image plane and α is an angle at which the spiral path penetrates the image plane.

23. A computed tomography apparatus as claimed in claim 22, wherein the scanner rotates the focus around a rotational axis that coincides with the system axis.

24. A computed tomography apparatus as claimed in claim 22, wherein the scanner rotates the focus around a symmetry axis that does not coincide with the system axis and which intersects the system axis at a gantry angle ρ, and wherein :

$$\gamma' = \arctan\frac{Sp\cdot\cos\rho}{\sqrt{4\pi^2\cdot R_f + S^2p^2 + 4\pi\cdot R_f\cos\alpha\sin\rho\cdot Sp}}$$

25. A computed tomography apparatus as claimed in claim 22 comprising an input unit connected to said computer for setting an optimum value γ_{min} of the inclination

angle γ for a magnitude of the maximum value of the tilt angle $|\delta_{max}|$ so that an error criterion is satisfied.

26. A computed tomography apparatus as claimed in claim 20, wherein the detector array comprises M adjacent rows extending transversely to the system axis, each row having a width S, and wherein said spiral path has a pitch p, and wherein said computer selects a plurality n_{ima} of the inclined image planes for which images having inclined image plane are generated for each spiral segment according to:

$$n_{ima} = \text{floor}\left[\frac{SM}{P}\right]$$

27. A computed tomography apparatus as claimed in claim 26, wherein said computer selects respective tilt angles δ(i) of the inclined image planes according to

$$\delta(i) = \delta_{max}\frac{2i-(n_{ima}-1)}{n_{ima}-1}$$

28. A computed tomography apparatus as claimed in claim 18, wherein said computer combines at least some of the plurality of images having inclined image plane to form a transverse tomogram having a transverse slice intersecting the system axis at a right angle.

29. A computed tomography apparatus as claimed in claim 28, wherein said computer combines the plurality of images with inclined image plane to form said transverse tomogram by interpolation.

30. A computed tomography apparatus as claimed in claim 28, wherein said computer combines the plurality of images with inclined image plane to form said transverse tomogram by forming an average.

31. A computed tomography apparatus as claimed in claim 30, wherein said computer combines the plurality of images with inclined image plane to form said transverse tomogram by weighted averaging.

32. A computed tomography apparatus as claimed in claim 28, wherein said computer selects images among the plurality of images with inclined image plane for combining for generating said transverse tomogram according to a desired slice thickness of the transverse slice.

33. A computed tomography apparatus as claimed in claim 32, wherein said computer selects said images among the images with inclined image plane having a smallest possible slice thickness.

34. A computed tomography apparatus as claimed in claim 32, wherein said computer selects said images among the plurality of images having inclined image plane for combining for generating said transverse tomogram according to

$N_M = 2 \cdot \max(z^*, \sup_\Phi \Delta z_R)/S \cdot N_S$.